What is claimed is:

1. A video guidance sensor system including an integrated range measuring capability, said system comprising:

a video guidance sensor including:

means, including a stationary tilted mirror and a laser illuminator for producing an output having an amplitude which can be controlled in real-time, for directing output light for reflection from a target such that return light reflected by said target is received by said sensor;

a camera for providing video images of the return light and producing a corresponding video output signal;

a signal processing unit, connected to the camera, for receiving and processing said video output signal and for producing a corresponding output signal; and

a communications computer for receiving sensor commands and transmitting said output signal from the signal processing unit; and

a time of flight range measuring sub-system for measuring a time period taken by output light to travel to the target and to be received as return light, said range measuring sub-system comprising:

a first photodetector for directly receiving the output light and for producing a corresponding output signal;

a second photodetector for receiving the return light and for producing a corresponding output signal; and

a digitizer, comprising at least one analog to digital converter, for receiving the output signals from said first and second photodetectors and for producing corresponding digital data;

said signal processing unit comprising a digital signal processor for processing the digital data produced by said digitizer to produce an output representative of said time period and thus of the range to the target, and for supplying said output to said computer.

2. A system according to claim 1 wherein the digitizer further comprises at least one programmable gain amplifier, connected upstream of said at least one analog to digital converter, for receiving said output signals from said first and second photodetectors.

3. A system according to claim 2 wherein said at least one analog to digital converter comprises dual analog to digital converters and said at least one programmable gain amplifier comprises dual programmable gain amplifiers.

4. A system according to claim 1 wherein said video guidance sensor further comprises a buffer memory connected between said digitizer and said digital signal processor, for storing said digital data prior to processing thereof by said digital signal processor.

5. A system according to claim 4 wherein said buffer memory comprises a first-in, first-out memory.

6. A system according to claim 1 wherein said light source is switched between a first optical power level for operation of the system as a video guidance sensor, and a second optical power level for operation of the system as a range measuring device.

7. A system according to claim 6 wherein said light source comprises at least one laser diode and a laser driver for the at least one laser diode.

8. A system according to claim 7 wherein said second power level is approximately one-half of the first power level.

9. A system according to claim 8 wherein said first power level is 100% power and said second power level is 50% power.

10. A system according to claim 7 wherein said at least one laser diode is operated at 10-20 kHz with a lower than 1 microsecond risetime.

11. A system according to claim 6 wherein the video guidance sensor operation includes spot, acquire and slow tracking measurement cycles and said range measurement operation is alternated with said measurement cycles for target distances over a range from 15-30 meters to 1-5 kilometers.

12. A system according to claim 1 wherein the time of flight range measuring sub-system measures said time period based on detection of a reflection transition in the return light and a fixed fraction trigger event criteria is used for detection of each transition in each cycle of the range.

13. A system according to claim 12 wherein said range measuring sub-system measurements uses said fixed fraction trigger event criteria to calculate a middle point of the slope of the return signal transition, and wherein a plurality of readings of multiple range measurement cycles are made in the frame time and are averaged to produce an averaged reading.

14. A system according to claim 13 wherein said range measuring sub-section determines said middle point as being halfway between 10% and 90% of the averaged reading.

15. In a video guidance sensor system comprising a video guidance sensor including means, including a laser light source, for directing output light onto a target located a distance from the video guidance sensor for reflection by the target so that return light reflected by the target is received by said sensor; a camera for providing video images of the return light and producing a corresponding video output signal; a signal processing unit, connected to the camera, for receiving and processing said video output signal and for producing

corresponding output signal; and a computer for receiving said output signal from the signal processing unit, the improvements wherein:

a time of flight range measuring sub-system is integrated into said video guidance sensor;

said system is alternately operated in a range measuring mode and a video guidance sensor mode,

said range measuring sub-system comprises first and second matched photodetectors for receiving said output light and said return light, respectively, and for producing corresponding output signals, and a digitizer, including programmable gain amplifiers and analog to digital converters, for digitizing said output signals and for producing corresponding outputs; and

said signal processing unit comprises a digital signal processor for processing said outputs to produce an output related to the distance to the target.

16. A system according to claim 15 further comprising a buffer memory, connected between said digitizer and said digital signal processor, for storing said digital data prior to processing thereof by said digital signal processor.

17. A system according to claim 16 wherein said buffer memory comprises a first-in, first-out memory.

18. A system according to claim 15 wherein said laser light source is switched between a first optical power level for operation of the system in said video guidance sensor mode, and a second, different optical power level for operation of the system in said range measuring mode.

19. A system according to claim 18 wherein said second power level is approximately one-half of the first power level.

20. A system according to claim 19 wherein said first power level is 100% power and said second power level is 50% power.

21. A system according to claim 15 wherein said laser light source comprises at least one laser diode operated at 10-20 kHz with a lower than 1 microsecond risetime.

22. A system according to claim 18 wherein operation in the video guidance sensor mode includes spot, acquire and slow tracking measurement cycles and wherein operation in said range measurement mode is alternated with said measurement cycles for target distances over a range from 15-30 meter to 1-5 kilometers.

23. A system according to claim 15 wherein the time of flight range measuring sub-system measures said time period based on detection of a reflection transition in the return light, and a fixed fraction trigger event criteria is used for detection of each reflection transition in each cycle off the range.

24. A system according to claim 23 wherein said range measuring sub-system uses said fixed fraction trigger event criteria to calculate a middle point of slope of the return signal transition, and wherein a plurality of readings are made of multiple range measurement cycles in the frame time and are averaged to produce an averaged reading.

25. A system according to claim 24 wherein said range measuring sub-system determines said middle point as being between halfway between 10% and 90% of the averaged reading.